Apprenticeship and Industry Training

Landscape Horticulturist

Apprenticeship Course Outline

4711.3 (2011)

Alberta

Apprenticeship and Industry Training

ALBERTA ADVANCED EDUCATION

Landscape horticulturist: apprenticeship course outline

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Landscape Horticulturist
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Course Outline

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Apprenticeship

Apprenticeship is post-secondary education with a difference. Apprenticeship begins with finding an employer. Employers hire apprentices, pay their wages and provide on-the-job training and work experience. Approximately 80 per cent of an apprentice's time is spent on the job under the supervision of a certified journeyperson or qualified tradesperson. The other 20 per cent involves technical training provided at, or through, a post-secondary institution – usually a college or technical institute.

To become certified journeypersons, apprentices must learn theory and skills, and they must pass examinations. Requirements for certification—including the content and delivery of technical training—are developed and updated by the Alberta Apprenticeship and Industry Training Board on the recommendation of Landscape Horticulturist Provincial Apprenticeship Committee.

The graduate of the Landscape Horticulturist apprenticeship program is a certified journeyperson who will be able:

- apply the principles and processes of landscape design and construction
- construct and install landscape structures and other accessories of various materials
- estimate and handle orders of plant and related materials
- plan and implement landscape installations
- operate and maintain the tools and machinery used in the Landscape Horticulturist Trade
- design, install and maintain irrigation systems
- operate a greenhouse, nursery, garden centre, sod farm or landscape business
- apply the principles of horticultural management and maintenance practices
- apply the principles of plant production
- manage growing media
- identify and apply knowledge of pests, weeds, disease and controls used by this industry
- apply specialized knowledge of plant botany and plant identification
- relate to other trades and professions working in the same environment, including underground services, heavy equipment operators, engineers, architects etc.
- employ environmental stewardship practices in landscape planning, installation and maintenance
- work effectively in key roles in public and private horticultural and landscaping business units
- perform assigned tasks in accordance with quality and production standards required by industry

Apprenticeship and Industry Training System

Industry-Driven

Alberta's apprenticeship and industry training system is an industry-driven system that ensures a highly skilled, internationally competitive workforce in more than 50 designated trades and occupations. This workforce supports the economic progress of Alberta and its competitive role in the global market. Industry (employers and employees) establishes training and certification standards and provides direction to the system through an industry committee network and the Alberta Apprenticeship and Industry Training Board. The Alberta government provides the legislative framework and administrative support for the apprenticeship and industry training system.

Alberta Apprenticeship and Industry Training Board

The Alberta Apprenticeship and Industry Training Board provides a leadership role in developing Alberta's highly skilled and trained workforce. The board's primary responsibility is to establish the standards and requirements for training and certification in programs under the Apprenticeship and Industry Training Act. The board also provides advice to the Minister of Advanced Education on the needs of Alberta's labour market for skilled and trained workers, and the designation of trades and occupations.

The thirteen-member board consists of a chair, eight members representing trades and four members representing other industries. There are equal numbers of employer and employee representatives.

Industry Committee Network

Alberta's apprenticeship and industry training system relies on a network of industry committees, including local and provincial apprenticeship committees in the designated trades, and occupational committees in the designated occupations. The network also includes other committees such as provisional committees that are established before the designation of a new trade or occupation comes into effect. All trade committees are composed of equal numbers of employer and employee representatives. The industry committee network is the foundation of Alberta's apprenticeship and industry training system.

Local Apprenticeship Committees (LAC)

Wherever there is activity in a trade, the board can set up a local apprenticeship committee. The board appoints equal numbers of employee and employer representatives for terms of up to three years. The committee appoints a member as presiding officer. Local apprenticeship committees:

- monitor apprenticeship programs and the progress of apprentices in their trade, at the local level
- make recommendations to their trade's provincial apprenticeship committee (PAC) about apprenticeship and certification in their trade
- promote apprenticeship programs and training and the pursuit of careers in their trade
- make recommendations to the board about the appointment of members to their trade's PAC
- help settle certain kinds of disagreements between apprentices and their employers
- carry out functions assigned by their trade's PAC or the board

Provincial Apprenticeship Committees (PAC)

The board establishes a provincial apprenticeship committee for each trade. It appoints an equal number of employer and employee representatives, and, on the PAC's recommendation, a presiding officer - each for a maximum of two terms of up to three years. Most PACs have nine members but can have as many as twenty-one. Provincial apprenticeship committees:

- Make recommendations to the board about:
    - standards and requirements for training and certification in their trade
    - courses and examinations in their trade
    - apprenticeship and certification
    - designation of trades and occupations
    - regulations and orders under the Apprenticeship and Industry Training Act
- monitor the activities of local apprenticeship committees in their trade
- determine whether training of various kinds is equivalent to training provided in an apprenticeship program in their trade
- promote apprenticeship programs and training and the pursuit of careers in their trade
- consult with other committees under the Apprenticeship and Industry Training Act about apprenticeship programs, training and certification and facilitate cooperation between different trades and occupations
- consult with organizations, associations and people who have an interest in their trade and with employers and employees in their trade
- may participate in resolving certain disagreements between employers and employees
- carry out functions assigned by the board

Landscape Horticulturist PAC Members at the Time of Publication

Ms. D. Di Santo	Cochrane	Presiding Officer
Mr. B. Kay	Water Valley	Employer
Ms. S. Gonsalves	Calgary	Employee
Ms. M. Rogers	Edmonton	Employee
Mr. J. Wotherspoon	Edmonton	Employer
Mr. L. Kading	Edmonton	Employee
Mr. W. Dorman	Calgary	Employer

Alberta Government

Alberta Advanced Education works with industry, employer and employee organizations and technical training providers to:

- facilitate industry's development and maintenance of training and certification standards
- provide registration and counselling services to apprentices and employers
- coordinate technical training in collaboration with training providers
- certify apprentices and others who meet industry standards

Technical Institutes and Colleges

The technical institutes and colleges are key participants in Alberta's apprenticeship and industry training system. They work with the board, industry committees and Alberta Advanced Education to enhance access and responsiveness to industry needs through the delivery of the technical training component of apprenticeship programs. They develop lesson plans from the course outlines established by industry and provide technical training to apprentices.

Apprenticeship Safety

Safe working procedures and conditions, incident/injury prevention, and the preservation of health are of primary importance in apprenticeship programs in Alberta. These responsibilities are shared and require the joint efforts of government, employers, employees, apprentices and the public. Therefore, it is imperative that all parties are aware of circumstances that may lead to injury or harm.

Safe learning experiences and healthy environments can be created by controlling the variables and behaviours that may contribute to or cause an incident or injury. By practicing a safe and healthy attitude, everyone can enjoy the benefit of an incident and injury free environment.

Alberta Apprenticeship and Industry Training Board Safety Policy

The Alberta Apprenticeship and Industry Training Board (board) fully supports safe learning and working environments and emphasizes the importance of safety awareness and education throughout apprenticeship training- in both on-the- job training and technical training. The board also recognizes that safety awareness and education begins on the first day of on-the-job training and thereby is the initial and ongoing responsibility of the employer and the apprentice as required under workplace health and safety training. However the board encourages that safe workplace behaviour is modeled not only during on-the-job training but also during all aspects of technical training, in particular, shop or lab instruction. Therefore the board recognizes that safety awareness and training in apprenticeship technical training reinforces, but does not replace, employer safety training that is required under workplace health and safety legislation.

The board has established a policy with respect to safety awareness and training:

> **The board promotes and supports safe workplaces, which embody a culture of safety for all apprentices, employers and employees. Employer required safety training is the responsibility of the employer and the apprentice, as required under legislation other than the *Apprenticeship and Industry Training Act*.**

The board's complete document on its 'Apprenticeship Safety Training Policy' is available at www.tradesecrets.alberta.ca; access the website and conduct a search for 'safety training policy'.
Implementation of the policy includes three common safety learning outcomes and objectives for all trade course outlines. These common learning outcomes ensure that each course outline utilizes common language consistent with workplace health and safety terminology. Under the title of 'Standard Workplace Safety', this first section of each trade course outline enables the delivery of generic safety training; technical training providers will provide trade specific examples related to the content delivery of course outline safety training.

Addendum

As immediate implementation of the board's safety policy includes common safety learning outcomes and objectives for all course outlines, this trade's PAC will be inserting these safety outcomes into the main body of their course outline at a later date. In the meantime the addendum below immediately places the safety outcomes and their objectives into this course outline thereby enabling technical training providers to deliver the content of these safety outcomes.

STANDARD WORKPLACE SAFETY

A. Safety Legislation, Regulations & Industry Policy in the Trades .....

Outcome: ***Describe legislation, regulations and practices intended to ensure a safe work place in this trade.***

1. Demonstrate the ability to apply the Occupational Health and Safety Act, Regulation and Code.
2. Explain the role of the employer and employee in regard to Occupational Health and Safety (OH&S) regulations, Worksite Hazardous Materials Information Systems (WHMIS), fire regulations, Workers Compensation Board regulations, and related advisory bodies and agencies.
3. Explain industry practices for hazard assessment and control procedures.
4. Describe the responsibilities of workers and employers to apply emergency procedures.
5. Describe positive tradesperson attitudes with respect to housekeeping, personal protective equipment and emergency procedures.
6. Describe the roles and responsibilities of employers and employees with respect to the selection and use of personal protective equipment (PPE).
7. Select, use and maintain appropriate PPE for worksite applications.

B. Climbing, Lifting, Rigging and Hoisting .....

Outcome: ***Describe the use of personal protective equipment (PPE) and safe practices for climbing, lifting, rigging and hoisting in this trade.***

1. Select, use and maintain specialized PPE for climbing, lifting and load moving equipment.
2. Describe manual lifting procedures using correct body mechanics.
3. Describe rigging hardware and the safety factor associated with each item.
4. Select the correct equipment for rigging typical loads.
5. Describe hoisting and load moving procedures.

C. Hazardous Materials & Fire Protection.....

Outcome: ***Describe the safety practices for hazardous materials and fire protection in this trade.***

1. Describe the roles, responsibilities features and practices related to the workplace hazardous materials information system (WHMIS) program.
2. Describe the three key elements of WHMIS.
3. Describe handling, storing and transporting procedures when dealing with hazardous material.
4. Describe safe venting procedures when working with hazardous materials.
5. Describe fire hazards, classes, procedures and equipment related to fire protection.

Workplace Health and Safety

A tradesperson is often exposed to more hazards than any other person in the work force and therefore should be familiar with and apply the Occupational Health and Safety Act, Regulations and Code when dealing with personal safety and the special safety rules that apply to all daily tasks.

Workplace Health and Safety (Alberta Employment, Immigration and Industry) conducts periodic inspections of workplaces to ensure that safety regulations for industry are being observed.

Additional information is available at www.worksafely.org

Technical Training

Apprenticeship technical training is delivered by the technical institutes and many colleges in the public post-secondary system throughout Alberta. The colleges and institutes are committed to delivering the technical training component of Alberta apprenticeship programs in a safe, efficient and effective manner. All training providers place great emphasis on safe technical practices that complement safe workplace practices and help to develop a skilled, safe workforce.

The following institutions deliver Landscape Horticulturist apprenticeship technical training:

Olds College

Procedures for Recommending Revisions to the Course Outline

Advanced Education has prepared this course outline in partnership with the Landscape Horticulturist Provincial Apprenticeship Committee.

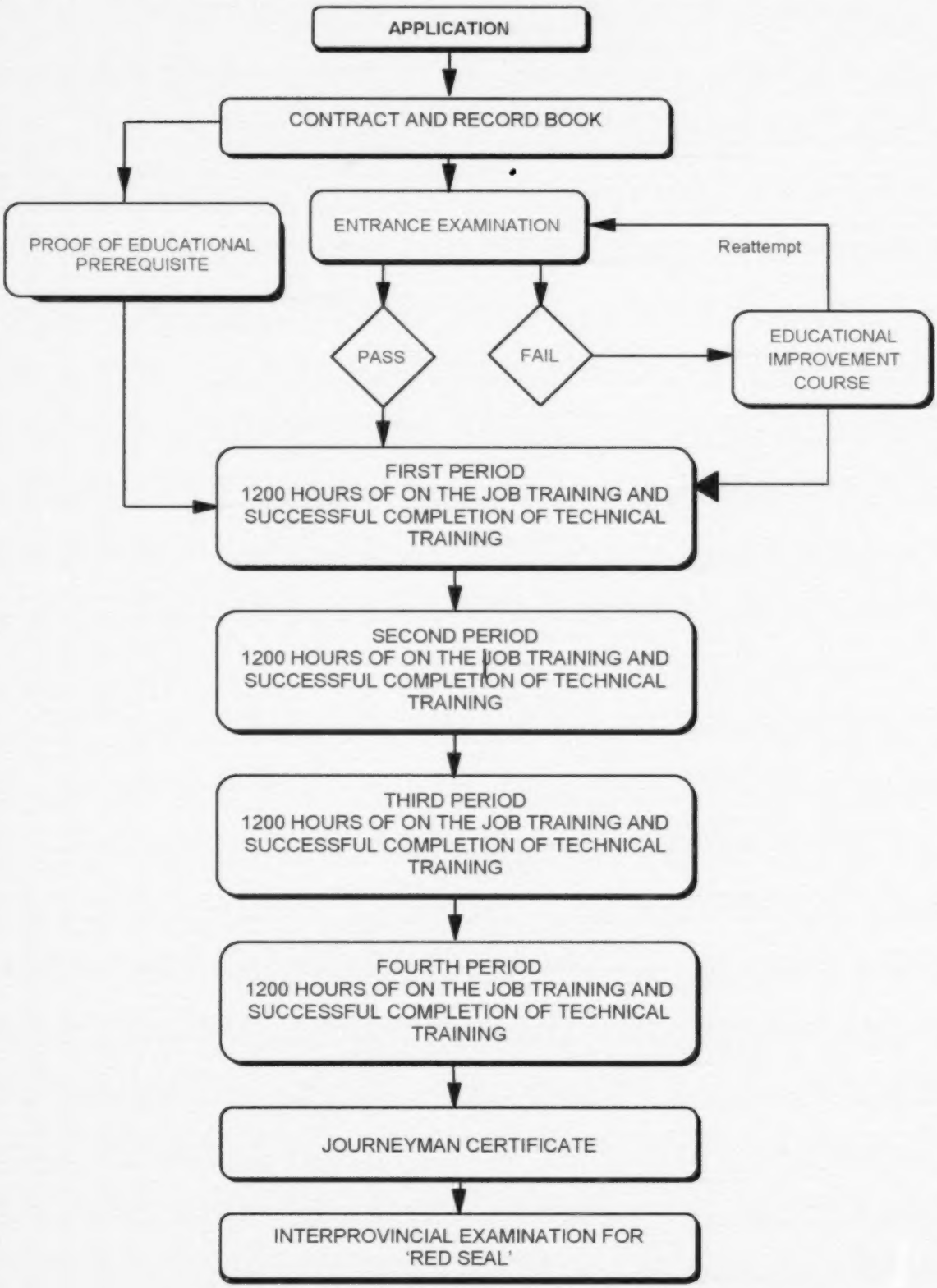
This course outline was approved on December 10, 2010 by the Alberta Apprenticeship and Industry Training Board on a recommendation from the Provincial Apprenticeship Committee. The valuable input provided by representatives of industry and the institutions that provide the technical training is acknowledged.

Any concerned individual or group in the province of Alberta may make recommendations for change by writing to:

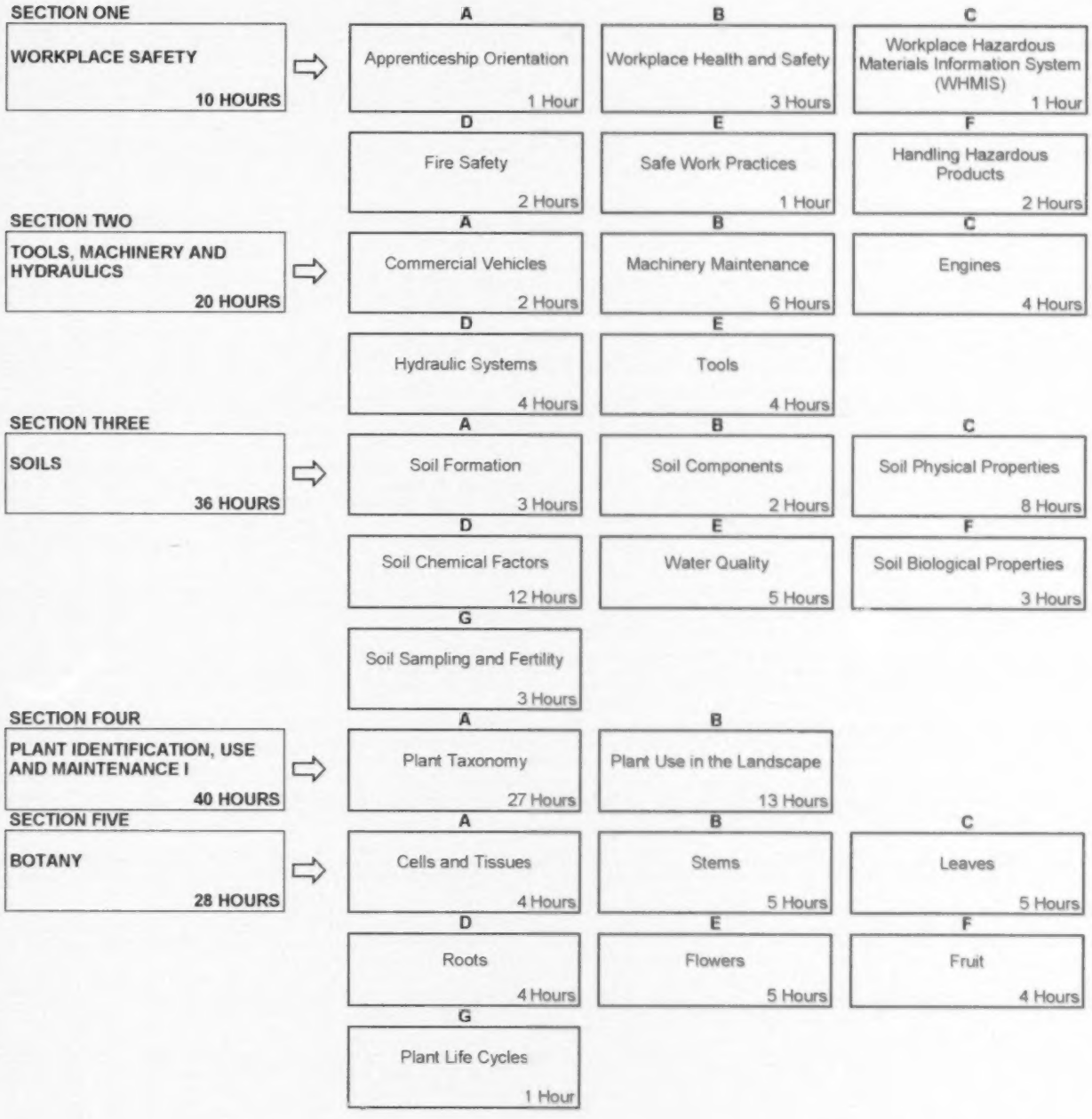
Landscape Horticulturist Provincial Apprenticeship Committee
c/o Industry Programs and Standards
Apprenticeship and Industry Training
Advanced Education
10th floor, Commerce Place
10155 102 Street NW
Edmonton AB T5J 4L5

It is requested that recommendations for change refer to specific areas and state references used. Recommendations for change will be placed on the agenda for regular meetings of the Landscape Horticulturist Provincial Apprenticeship Committee.

Apprenticeship Route toward Certification


APPLICATION
CONTRACT AND RECORD BOOK
PROOF OF EDUCATIONAL PREREQUISITE
ENTRANCE EXAMINATION
Reattempt
PASS
FAIL
EDUCATIONAL IMPROVEMENT COURSE
FIRST PERIOD
1200 HOURS OF ON THE JOB TRAINING AND SUCCESSFUL COMPLETION OF TECHNICAL TRAINING
SECOND PERIOD
1200 HOURS OF ON THE JOB TRAINING AND SUCCESSFUL COMPLETION OF TECHNICAL TRAINING
THIRD PERIOD
1200 HOURS OF ON THE JOB TRAINING AND SUCCESSFUL COMPLETION OF TECHNICAL TRAINING
FOURTH PERIOD
1200 HOURS OF ON THE JOB TRAINING AND SUCCESSFUL COMPLETION OF TECHNICAL TRAINING
JOURNEYMAN CERTIFICATE
INTERPROVINCIAL EXAMINATION FOR 'RED SEAL'

Landscape Horticulturist Training Profile
FIRST PERIOD
(8 Weeks 30 Hours per Week – Total of 240 Hours)



SECTION SIX

GREENHOUSE PRODUCTION AND ENVIRONMENT

44 HOURS

A	B	C
Containerisation and Media 4 Hours	Greenhouse Environment 4 Hours	Propagation 4 Hours
D	**E**	**F**
Growing On 4 Hours	Hardening Off 2 Hours	Plant Health Problems 6 Hours
G	**H**	**I**
Plant Handling 2 Hours	Greenhouse Structures 9 Hours	Environmental Control Systems 9 Hours

SECTION SEVEN

LANDSCAPE CONSTRUCTION AND MAINTENANCE FUNDAMENTALS

62 HOURS

A	B	C
Basic Grading and Site Preparation 14 Hours	Turf Selection and Installation 20 Hours	Woody Plant Selection 4 Hours
D	**E**	
Woody Plant Installation 10 Hours	Pruning Fundamentals 14 Hours	

SECOND PERIOD
(8 Weeks 30 Hours per Week – Total of 240 Hours)

SECTION ONE

WORKPLACE COMMUNICATION AND PERSONAL MANAGEMENT
24 HOURS

A	B	C
Personal Management 4 Hours	Oral Communication 7 Hours	Interpersonal Communication 5 Hours

D	E
Written Communication 3 Hours	Professional Practice 5 Hours

SECTION TWO

IRRIGATION FUNDAMENTALS
22 HOURS

A	B	C
Introduction to Irrigation 2 Hours	Soil-Plant-Water Relationships 7 Hours	Irrigation Systems 8 Hours

D
Pumping Systems 5 Hours

SECTION THREE

SITE ASSESSMENT, SURVEYING AND LAYOUT
36 HOURS

A	B
Site Assessment 6 Hours	Surveying 30 Hours

SECTION FOUR

LANDSCAPE CONSTRUCTION I
42 HOURS

A	B	C
Retaining Wall Construction 17 Hours	Modular and Natural Stone Features 17 Hours	Timber Construction 5 Hours

D
Concrete Fundamentals 3 Hours

SECTION FIVE

PLANT IDENTIFICATION, USE AND MAINTENANCE II
40 HOURS

A	B
Plant Taxonomy 27 Hours	Plant Use in the Landscape 13 Hours

SECTION SIX

PEST MANAGEMENT
54 HOURS

A	B	C
Integrated Pest Management 10 Hours	Insect Identification and Management 12 Hours	Disease Identification and Management 4 Hours

D	E	F
Plant Disorders 2 Hours	Weed Identification and Management 16 Hours	Pesticide Safety and Legislation 10 Hours

SECTION SEVEN

TURF MAINTENANCE
22 HOURS

A	B
Turfgrass Fertilization 4 Hours	Sustainable Turfgrass Practices 18 Hours

THIRD PERIOD
(8 Weeks 30 Hours per Week – Total of 240 Hours)

SECTION ONE

LANDSCAPE DESIGN FUNDAMENTALS
40 HOURS

A	B	C
Introduction to Landscape Design 1 Hour	Design Principles and Elements 6 Hours	Manual Graphics 7 Hours
D	**E**	
Design Process 14 Hours	Master Plan 12 Hours	

SECTION TWO

PLANT IDENTIFICATION, USE AND MAINTENANCE III
40 HOURS

A	B
Plant Taxonomy 27 Hours	Plant Use in the Landscape 13 Hours

SECTION THREE

PLANT PHYSIOLOGY
20 HOURS

A	B	C
Biochemical Processes 8 Hours	Transport in the Plant 4 Hours	Growth and Development in Plants 3 Hours
D		
Plant Stress 5 Hours		

SECTION FOUR

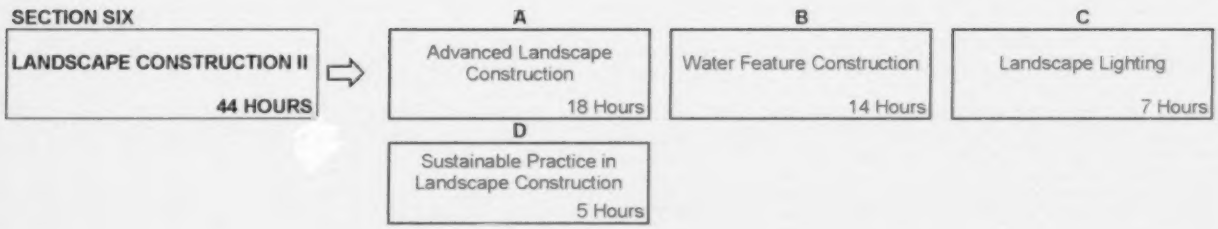
SUSTAINABLE IRRIGATION PRACTICES
46 HOURS

A	B	C
Irrigation System Planning 1 Hour	Principles of Hydraulics 5 Hours	Design Concepts 9 Hours
D	**E**	**F**
Design Factors 2 Hours	Specifications 2 Hours	Installation 12 Hours
G	**H**	**I**
Maintenance and Repair 3 Hours	Systems Troubleshooting 2 Hours	Sustainable Water Management Practices 10 Hours

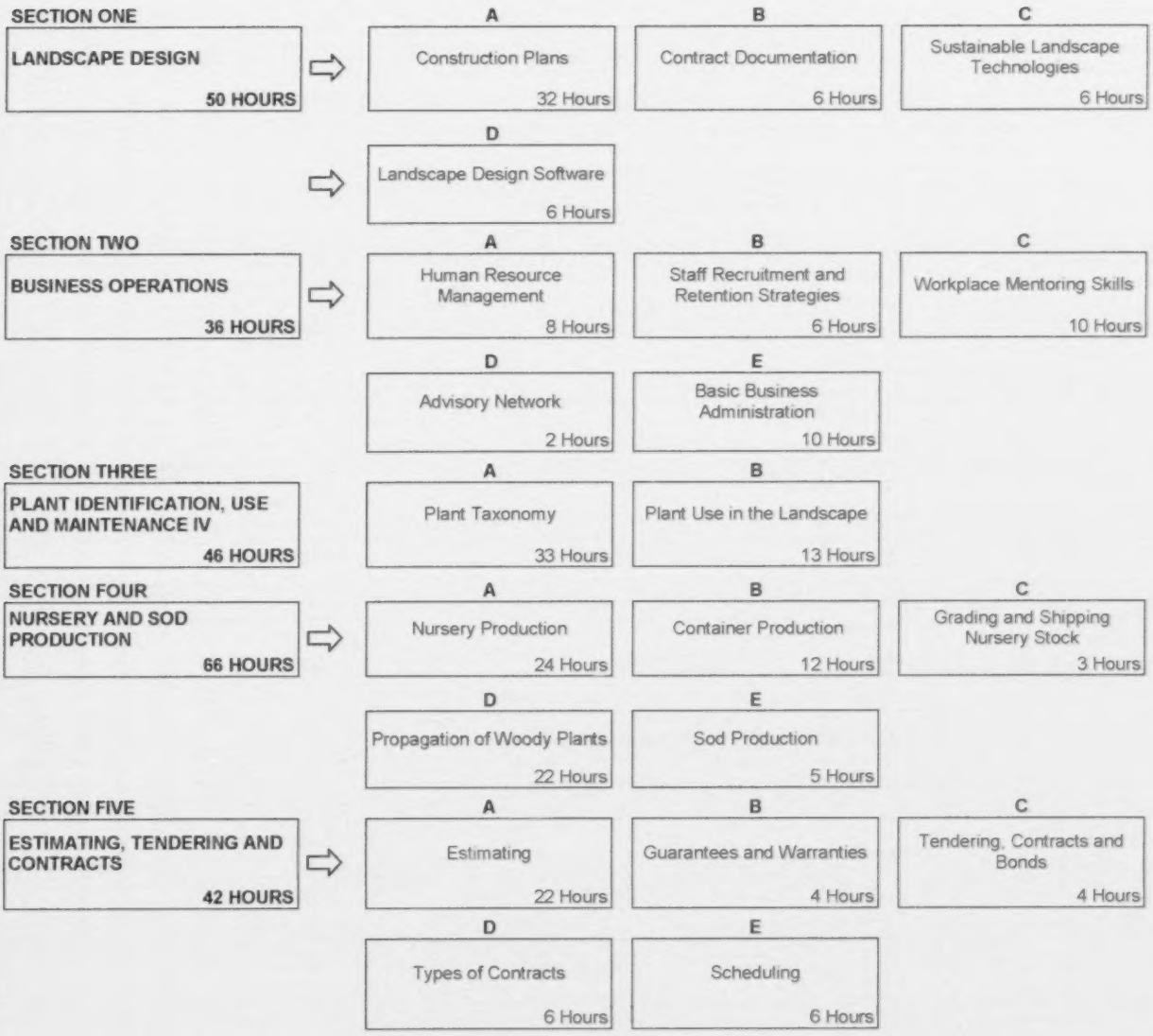
SECTION FIVE

ARBORICULTURE AND URBAN FORESTRY
50 HOURS

A	B	C
Introduction 3 Hour	Tree Biology 6 Hours	Pruning 6 Hours
D	**E**	**F**
Tree Support Systems 2 Hours	Tree Removal 5 Hours	Working Aloft 4 Hours
G	**H**	**I**
Tree Risk Assessment 7 Hours	Tree Valuation 6 Hours	Tree Inventory 9 Hours
J	**K**	
Tree Protection 1 Hour	Arboriculture and the Law 1 Hours	


SECTION SIX
LANDSCAPE CONSTRUCTION II
44 HOURS
A
Advanced Landscape Construction
18 Hours
B
Water Feature Construction
14 Hours
C
Landscape Lighting
7 Hours
D
Sustainable Practice in Landscape Construction
5 Hours

Fourth Period
(8 Weeks 30 Hours Per Week – Total of 240 Hours)



NOTE: The hours stated are for guidance and should be adhered to as closely as possible. However, adjustments must be made for rate of apprentice learning, statutory holidays, registration and examinations for the training establishment and Apprenticeship and Industry Training.

FIRST PERIOD TECHNICAL TRAINING
LANDSCAPE HORTICULTURIST TRADE
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:.....WORKPLACE SAFETY ..... 10 HOURS

A. Apprenticeship Orientation.....1 Hour

Outcome: Describe responsibilities and opportunities in the Landscape Horticulturist trade.

1. Describe principles of the apprenticeship training system in Alberta.
2. Identify the training profile of the Landscape Horticulturist apprenticeship in Alberta.
3. Describe the responsibilities of the apprentice, employer and Alberta Apprenticeship and Industry Training for the Contract of Apprenticeship.
4. Explain the Landscape Horticulturist course outline learning outcomes and objectives.
5. Outline the contents of the apprenticeship training Record Book.
6. Identify employment opportunities for landscape horticulturists.

B. Workplace Health and Safety.....3 Hours

Outcome: Describe employer and employee responsibilities related to workplace health and safety regulations.

1. Describe the functions of Alberta Workplace Health and Safety (OH & S) and the Workers' Compensation Board (WCB).
2. Describe selected personal protection equipment (PPE).
3. Describe safe work practices required by OH & S.

C. Workplace Hazardous Materials Information System (WHMIS).....1 Hour

Outcome: Apply WHMIS guidelines at the workplace.

1. Explain the purpose of WHMIS training.
2. State the principle requirements of WHMIS.
3. Explain the roles and responsibilities of employers, suppliers and workers within WHMIS regulations.

D. Fire Safety.....2 Hours

Outcome: Explain approved fire extinguishing procedures.

1. Identify the elements of combustion and classes of fires.
2. Describe types of fire extinguishers, their contents, application and maintenance.
3. Explain procedures for extinguishing fires.

E. Safe Work Practices.....1 Hour

Outcome: Identify worksite hazards and use safe work practices.

1. Explain first aid procedures and levels of certification.
2. Identify hazards associated with personal apparel.
3. Identify machinery and equipment hazards.
4. Identify air and water hazards.
5. Describe safe housekeeping practices in the workplace.

F. Handling Hazardous Products.....2 Hours

Outcome: Describe safe practices when using pesticides, fertilizers and other hazardous products.

1. Describe current federal and provincial legislation for hazardous products that relate to the horticultural industry.
2. Apply terminology used to describe toxicity of hazardous products.
3. Interpret hazardous product labels.
4. Assess hazardous products in relation to applicator safety and potential environmental hazards.
5. Describe safe practices in the storage, use, handling and transport of hazardous products.
6. Describe procedures for containing and cleaning up a toxic spill.
7. Use resource material to interpret information on hazardous product use.

SECTION TWO: ..... TOOLS, MACHINERY AND HYDRAULICS..... 20 HOURS

A. Commercial Vehicles.....2 Hours

Outcome: Perform safety checks on commercial vehicles.

1. Identify safety equipment required for commercial vehicles used in the Landscape Horticulturist trade.
2. Demonstrate the location of selected hazard warning devices.
3. Perform a pre-trip inspection.

B. Machinery Maintenance.....6 Hours

Outcome: Demonstrate recommended maintenance practices on machinery.

1. Describe three-point hitch classes, parts and adjustments.
2. Describe the components of Power Take Off (PTO) coupler shafts and their speeds.
3. Identify machinery protection features.
4. Describe belt and chain drive systems.
5. Describe maintenance for belt, chain and PTO drive systems.
6. Describe machinery lubrication practices.
7. Demonstrate selected machinery maintenance practices.

C. Engines.....4 Hours

Outcome: Perform basic engine maintenance and operation.

1. Identify engine components.
2. Identify the two and four stroke cycle events for gasoline and diesel engines.
3. Explain the function and maintenance of selected systems:
   a) lubrication
   b) exhaust
   c) intake
   d) electrical
4. Interpret maintenance schedules for engines or machines.
5. Identify precautions for cold weather start-up.
6. Identify procedures for engine shut-down.

D. Hydraulic Systems.....4 Hours

Outcome: Explain hydraulic system operation and basic maintenance practices.

1. Describe hydraulic fluid principles.
2. Describe the purpose of hydraulic system components and accessories.
3. Select appropriate hydraulic fluids for the required application.
4. Describe procedures for locating leaks.
5. Describe daily routine procedures for checking hydraulic systems.
6. Describe hydraulic tests to troubleshoot operational problems.

E. Tools.....4 Hours

Outcome: Demonstrate the use and maintenance of hand and power tools.

1. Describe the selection, safety precautions, use and maintenance of non-cutting hand tools.
2. Describe the selection, safety precautions, use and maintenance of cutting hand tools.
3. Describe the selection, safety precautions, use and maintenance of selected electrical and air tools.

SECTION THREE: .....SOILS ..... 36 HOURS

A. Soil Formation.....3 Hours

Outcome: Describe the process of natural soil formation

1. Identify the soil forming factors.
2. Describe the characteristics of grassland, forest and urban soils.
3. Access Canadian soil map information.

B. Soil Components.....2 Hours

Outcome: Describe how soil components influence soil properties

1. Describe an ideal mineral soil.
2. Describe how soil components influence soil properties.

C. Soil Physical Properties.....8 Hours

Outcome: Describe the effects of physical properties of soils on plant growth

1. Evaluate soil texture and structure.
2. Explain the relationship between plant growth, soil texture and soil structure.
3. Describe the formation of stable soil aggregates.
4. Define soil compaction.
5. Calculate soil Bulk Density.
6. Describe methods and practices to prevent or ameliorate soil compaction issues.
7. Provide pre-design recommendations to prevent/reduce soil compaction.
8. Provide guidelines for soil preservation during stages of development.
9. Interpret soil physical properties from soil test reports.

D. Soil Chemical Factors.....12 Hours

Outcome: Describe the effects of soil chemical properties on plant growth

1. Describe cation exchange capacity (CEC).
2. Describe the principles of base saturation.
3. Examine soil reaction (pH) and its effects on nutrient availability.
4. Examine soil salinity and its effects on plant growth.
5. Examine soil sodicity and its effects on plant growth and soil structure.
6. Describe chemical and physical amendments used to modify soil chemistry.
7. Perform lab tests to determine pH, EC, SAR and carbonate levels..
8. Interpret soil chemical properties from soil test reports.

E. Water Quality.....5 Hours

Outcome: Evaluate the effects of water quality on soil and plant growth

1. Identify criteria for assessing water quality.
2. Perform water quality testing.
3. Interpret water quality reports.
4. Classify water quality.
5. Identify amendments strategies employed when using poor quality water.

F. Soil Biological Properties.....3 Hours

Outcome: Describe the effects of soil biological properties on plant growth

1. Evaluate the role of soil biota.
2. Describe the conditions that influence the growth and function of soil organisms.
3. Describe organic matter cycling and its influence on plant growth.
4. Identify the roles that microorganisms play in the nitrogen and sulphur cycles.
5. Explain the influence of C:N ratios in the process of organic matter breakdown.
6. Interpret lab results from compost testing.
7. Describe compost quality standards in Canada.

G. Soil Sampling and Fertility.....3 Hours

Outcome: Assess horticultural capabilities of soils

1. Identify the essential plant nutrients and their plant-available forms.
2. Identify deficiencies of macro-nutrients and selected micro-nutrients.
3. Compare natural and synthetic fertilizers.
4. Perform basic fertilizer calculations.
5. Identify the process of soil sampling for selected landscape situations.
6. Recommend soil amendments for a selected soil.

SECTION FOUR: ..... PLANT IDENTIFICATION, USE AND MAINTENANCE I..... 40 HOURS

A. Plant Taxonomy.....27 Hours

Outcome: Identify selected plants and plant families.

1. Demonstrate procedures in plant specimen collection and preparation for herbarium samples.
2. Identify specific taxonomic features of selected plant families and genera.
3. Use taxonomic keys to identify plants.
4. Identify selected woody and herbaceous plants by growth habit and ornamental features.
5. Identify selected woody and herbaceous plants relative to their role in natural ecosystems.
6. Identify primary horticultural references for plant identification.
7. Identify current issues in plant identification and classification for the horticulture industry.
8. Apply binomial nomenclature (genus, specific epithet) to identify selected species from the following chart:

Woody Plants		Herbaceous Plants	
Family	Genera	Family	Genera
1. ACERACEAE	a) *Acer*	1. ASTERACEAE	a) *Osteospermum*
2. BETULACEAE	a) *Betula*		b) *Senecio*
3. CUPRESSACEAE	a) *Juniperus*		c) *Tagetes*
	b) *Thuja*	2. BEGONIACEAE	a) *Begonia*
4. CORNACEAE	a) *Cornus*	3. BRASSICACEAE	a) *Lobularia*
5. OLEACEAE	a) *Fraxinus*	4. GERANIACEAE	a) *Pelargonium*
	b) *Syringa*	5. LOBELIACEAE	a) *Lobelia*
6. FABACEAE	a) *Caragana*	6. PORTULACEAE	a) *Portulaca*
7. PINACEAE	a) *Larix*	7. SCROPHULARIACEAE	a) *Antirrhinum*
	b) *Picea*	8. SOLANACEAE	a) *Calibrachoa*
	c) *Pinus*		b) *Petunia*
8. ROSACEAE	a) *Amelanchier* b) *Cotoneaster*	9. VIOLACEAE	a) *Viola*
	c) *Potentilla*		
	d) *Prunus*		
	e) *Rosa*		
	f) *Sorbus*		
9. SALICACEAE	a) *Populus* b) *Salix*		
10. ULMACEAE	a) *Ulmus*		

B. Plant Use in the Landscape.....13 Hours

Outcome: Select plant materials for use in the landscape.

1. Describe the function, value and physical characteristics of plants for the landscape.
2. Describe growth and maintenance requirements for selected species.
3. Describe procedures for establishing annual bedding plants in container and ground beds.
4. Describe practices for maintaining annual bedding plants throughout the growing season.

SECTION FIVE: ..... BOTANY ..... 28 HOURS

A. Cells and Tissues.....4 Hours

Outcome: Identify the roles and functions of selected plant cells and tissues.

1. Describe the role of selected components of a plant cell.
2. Describe the role of selected types of meristematic tissues.
3. Describe the function of selected permanent tissues.

B. Stems.....5 Hours

Outcome: Identify the functions and growth patterns of a plant stem.

1. Outline the main functions of the stem.
2. Locate the main external features of a stem.
3. Differentiate between old and new growth on a woody stem.
4. Locate selected internal regions of a stem.
5. Explain the process of primary growth.
6. Explain the process of secondary growth.
7. Compare the anatomy, morphology and growth patterns of monocot and dicot stems.
8. Compare horticulturally important specialized stems.

C. Leaves.....5 Hours

Outcome: Identify the main functions of leaves.

1. Describe the main functions of leaves.
2. Use terminology to identify selected aspects of leaf morphology.
3. Explain the role of selected tissues found in a leaf.
4. Describe the process of leaf initiation and development.
5. Compare monocot and dicot leaf morphology and anatomy
6. Describe the purpose of selected specialized leaves.

D. Roots.....4 Hours

Outcome: Identify the functions and growth characteristics of roots.

1. Describe the main functions of roots.
2. Compare the physical and growth characteristics of different types of root systems.
3. Describe the function of selected regions in the internal structure of a root.
4. Describe the process of root growth.
5. Identify factors that promote and inhibit root growth and development.
6. Explain the function of selected specialized roots.

E. Flowers.....5 Hours

Outcome: Identify flower types and their functions.

1. Describe the functions of flowers.
2. Explain the processes of pollination and fertilization.

3. Apply terminology to selected flower morphology.
4. Compare the features of monocot and dicot flowers.

F. Fruit.....4 Hours

Outcome: Compare the process of fruit development in fruit types.

1. Describe the process of fruit development.
2. Identify selected types of fruit.
3. Compare the structure of seeds and fruits.
4. Identify the major internal parts of a fruit.

G. Plant Life Cycles.....1 Hour

Outcome: Describe the life cycles of plants.

1. Describe plants in terms of their life cycles.
2. Explain the relevance of plant life cycles in terms of horticultural practices.

SECTION SIX:.....GREENHOUSE PRODUCTION AND ENVIRONMENT..... 44 HOURS

A. Containerization and Media.....4 Hours

Outcome: Compare plant containers and growing media for plant production.

1. Identify selected greenhouse containers and their uses.
2. Compare containers used in greenhouse production.
3. Describe the characteristics of selected container media components.
4. Compare selected greenhouse media mixtures and amendments.
5. Demonstrate selected media preparation methods.

B. Greenhouse Environment.....4 Hours

Outcome: Explain how a greenhouse environment can influence plant growth.

1. Describe the relationship between stage of growth and environmental requirements.
2. Explain how to manipulate photoperiod to control plant growth.
3. Describe the relationship between stage of growth and nutrient requirements.
4. Describe the characteristics and application methods of fertilizers used in greenhouse production.
5. Describe the effect of water quality and temperature on plant uptake and growth.

C. Propagation.....4 Hours

Outcome: Demonstrate propagation techniques for greenhouse production.

1. Practice selected vegetative propagation techniques.
2. Demonstrate seeding techniques.
3. Explain general germination requirements.
4. Describe the advantages and disadvantages of plug production.

D. Growing-On.....4 Hours

Outcome: Demonstrate transplanting and potting techniques.

1. Practice the transplanting of seedlings.
2. Describe maintenance requirements for new transplants.
3. Demonstrate the potting-up of vegetative cuttings.
4. Demonstrate re-potting methods.

E. Hardening-Off.....2 Hours

Outcome: Explain the procedures for hardening-off plants.

1. Explain the benefits of hardening off plants.
2. Describe procedures for hardening off plants.
3. Describe the tolerance factors of selected plants.

F. Plant Health Problems.....6 Hours

Outcome: Describe greenhouse pests, diseases and environmental influences on plant health.

1. Identify common greenhouse pests and their damage symptoms
2. Identify common greenhouse diseases and their damage symptoms.
3. Describe cultural practices useful in reducing the incidence of plant disease.
4. Describe abiotic causes of poor crop health.
5. Identify symptoms of phytotoxic pollutants in greenhouse environments.

G. Plant Handling.....2 Hours

Outcome: Describe efficient methods for packaging, storing and shipping greenhouse crops.

1. Outline common practices in the packaging, storage and shipment of crops produced in the greenhouse.
2. Describe conditions that affect plant value throughout handling and shipping practices.

H. Greenhouse Structures.....9 Hours

Outcome: Evaluate greenhouse structures and equipment.

1. Identify typical greenhouse designs.
2. Assess the orientation of greenhouse structures.
3. Compare materials used in greenhouse construction and layout.

I. Environmental Control Systems.....9 Hours

Outcome: Operate greenhouse environmental control systems.

1. Explain procedures for temperature control in a greenhouse.
2. Describe systems used to control greenhouse environments.
3. Explain procedures for supplying water to greenhouse crops.
4. Compare selected systems for irrigation and misting.
5. Compare selected lighting systems used in the production of greenhouse crops.

6. Explain the practice of carbon dioxide enrichment of greenhouse crops.
7. Compare selected carbon dioxide injection systems.

SECTION SEVEN: LANDSCAPE CONSTRUCTION AND MAINTENANCE FUNDAMENTALS..... 62 HOURS

A. Basic Grading and Site Preparation.....14 Hours

Outcome: Demonstrate procedures for site grading and preparation.

1. Perform slope calculations for site grading and preparation.
2. Describe technical systems that provide drainage on a landscape construction site:
   a) surface drainage systems
   b) subsurface drainage systems
3. Calculate soil volumes for selected site grading requirements.
4. Compare the capabilities of selected equipment used to cut/fill a landscape site.
5. Sketch a basic site drainage plan.
6. Demonstrate final site preparation (fine grading).

B. Turf Selection and Installation.....20 Hours

Outcome: Install turf grass in a landscape.

1. Describe the characteristics of selected types of turf grasses.
2. Describe the effects of harvesting, handling and storage on sod quality.
3. Describe the process of seedbed preparation.
4. Calculate seeding rates.
5. Describe selected seeding practices.
6. Demonstrate procedures for laying sod.
7. Describe procedures for establishing turf grass.

C. Woody Plant Selection.....4 Hours

Outcome: Identify criteria for sourcing and selecting woody plant material.

1. Interpret industry standards and specifications for woody plant material.
2. Select healthy stock for installation.

D. Woody Plant Installation.....10 Hours

Outcome: Demonstrate selected installation practices for woody plants.

1. Interpret planting specifications and site layout.
2. Demonstrate loading and unloading procedures.
3. Describe on-site storage of woody plant material.
4. Demonstrate woody plant material installation procedures.
5. Demonstrate plant support methods.
6. Demonstrate maintenance practices employed during the establishment period.

E. Pruning Fundamentals.....14 Hours

Outcome: Demonstrate basic pruning techniques.

1. Explain the reasons for pruning woody plants.
2. Describe the effects of pruning.
3. Define pruning terminology.
4. Identify selected pruning tools and equipment.
5. Demonstrate selected pruning techniques.

SECOND PERIOD TECHNICAL TRAINING
LANDSCAPE HORTICULTURIST TRADE
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:..... WORKPLACE COMMUNICATION & PERSONAL MANAGEMENT ..... 24 HOURS

A. Personal Management.....4 Hours

Outcome: Apply intrapersonal management strategies & techniques.

1. Describe intrapersonal skills that effect workplace success.
2. Identify strategies to develop confidence in workplace communication
3. Describe strategies for time management
4. Identify strategies to address stress in the workplace.

B. Oral Communication.....7 Hours

Outcome: Demonstrate effective oral communication.

1. Apply components of the communication process.
2. Demonstrate verbal communication strategies and techniques.
3. Demonstrate non-verbal strategies and techniques.
4. Deliver a presentation.

C. Interpersonal Communication.....5 Hours

Outcome: Apply interpersonal communication principles to build and maintain relationships

1. Describe the principles of interpersonal communication.
2. Explain how mediated communication impacts relationships.
3. Explain the guidelines of ethical communication.
4. Describe conflict management styles and strategies for dealing with interpersonal conflict.

D. Written Communication.....3 Hours

Outcome: Demonstrate written communication skills relevant to the horticultural industry.

1. Use conventions of sentence construction and grammar in written communications.
2. Practice proof-reading and editing skills.
3. Produce an industry-specific written document.

E. Professional Practice.....5 Hours

Outcome: Describe skills required to build a positive relationship with customers.

1. Identify characteristics of professional behaviour as it relates to the horticultural industry:
2. Describe the role of the professional in meeting customer needs.
3. Describe the principles of customer service.

SECTION TWO: ..... IRRIGATION FUNDAMENTALS ..... 22 HOURS

A. Introduction to Irrigation.....2 Hours

Outcome: Describe irrigation conservation principles.

1. Explain the use of irrigation technology to maintain plant health and conserve water.
2. Describe regulatory requirements for water use.

B. Soil - Plant - Water Relationships.....7 Hours

Outcome: Determine water requirements for specific plants and site conditions.

1. Describe irrigation requirements relative to plant types, soil types and environmental conditions.
2. Perform calculations related to sprinkler run time.
3. Explain outcomes of an irrigation audit.

C. Irrigation Systems.....8 Hours

Outcome: Identify the components of residential and commercial irrigation systems.

1. Identify selected irrigation system components and their uses.
2. Determine system capacity.
3. Describe methods to maximize irrigation system efficiency.
4. Explain how water quality can affect the choice of irrigation system components.

D. Pumping Systems.....5 Hours

Outcome: Explain the use and application of irrigation pumps.

1. Explain the operation of various types of irrigation pumps.
2. Calculate total dynamic head.

SECTION THREE: ..... SITE ASSESSMENT, SURVEYING AND LAYOUT..... 36 HOURS

A. Site Assessment.....6 Hours

Outcome: Create a base plan.

1. Gather all required information from a landscape site.
2. Use a Real Property Report to extract legal information about a landscape site.
3. Describe how grade certificates are used in the creation of a base plan.
4. Describe how grades are illustrated on a plan.
5. Generate a base plan based on selected specifications.

B. Surveying.....30 Hours

Outcome: Use surveying to lay out a landscape construction site.

1. Define basic terminology used in surveying.
2. Use selected survey equipment.
3. Interpret working drawings
4. Demonstrate the process for laying out a landscape construction site.

5. Demonstrate the collection and recording of on-site survey data.
6. Interpret survey/site data.
7. Demonstrate the use of grade stakes.
8. Demonstrate the use of scale on working drawings.

SECTION FOUR: ..... LANDSCAPE CONSTRUCTION I ..... 42 HOURS

A. Retaining Wall Construction.....17 Hours

Outcome: Construct a retaining wall.

1. Describe selected retaining wall systems.
   a) purpose
   b) materials
   c) functional design styles
2. Describe critical design factors for retaining wall construction:
   a) codes and standards
   b) estimated stress loads
   c) weight distribution
   d) corner bracing
   e) height restrictions
   f) anchoring systems
   g) battered walls
3. Fabricate a modular retaining wall system:
   a) Interpret construction drawings
   b) estimate materials required
   c) lay out and construct retaining wall structure

B. Modular and Natural Stone Features.....17 Hours

Outcome: Fabricate a patio or walkway using basic paving units or natural stone.

1. Assess paving and natural stone for selected applications and maintenance.
2. Describe engineering standards for paving stone installation.
3. Demonstrate layout for a selected installation project.
4. Demonstrate sub-grade and base preparation.
5. Interpret Proctor Density compaction tests.
6. Estimate materials for a selected project.
7. Demonstrate the manual installation of precast pavers.
8. Describe ongoing maintenance requirements for natural and manufactured paving stone systems.

C. Timber Construction.....5 Hours

Outcome: Fabricate a landscape feature using timber construction.

1. Interpret blueprints and specifications for a timber construction project.
2. Assess wood types for selected applications and maintenance.
3. Calculate materials requirements.

4. Demonstrate layout for a selected project.
5. Construct a selected project.

D. Concrete Fundamentals.....3 Hours

Outcome: Assess concrete as a landscape construction material.

1. Assess concrete as a design material.
2. Describe the requirements of making quality concrete.
3. Describe concrete surface defects.
4. Compare types of hardware for fastening to concrete.

SECTION FIVE: .....PLANT IDENTIFICATION, USE AND MAINTENANCE II ..... 40 HOURS

A. Plant Taxonomy.....27 Hours

Outcome: Identify selected plants and plant families.

1. Demonstrate procedures in plant specimen collection and preparation for herbarium samples.
2. Identify specific taxonomic features of selected plant families and genera.
3. Use taxonomic keys to identify plants.
4. Identify selected woody and herbaceous plants by growth habit and ornamental features.
5. Identify selected woody and herbaceous plants relative to their role in ecosystems.
6. Identify primary horticultural references for plant identification.
7. Identify current issues in plant identification and classification for the horticulture industry.
8. Apply binomial nomenclature (genus, specific epithet) to identify selected species from the following chart:

Woody Plants		Herbaceous Plants	
Family	Genera	Family	Genera
1. ACERACEAE	a) *Acer*	1. APIACEAE	a) *Aegopodium*
2. BETULACEAE	a) *Betula*	2. APOCYEAE	a) *Vinca*
3. CORNACEAE	a) *Cornus*	3. ASTERACEAE	a) *Artemisia*
4. CUPRESSACEAE	a) *Juniperus*		b) *Echinacea*
	b) *Microbiota*	4. CARYOPHYLLACEAE	a) *Cerastium*
5. ELAEAGNACEAE	a) *Elaeagnus*		b) *Dianthus*
	b) *Hippophae*	5. CORNACEAE	a) *Cornus*
	c) *Shepherdia*	6. CRASSUALACEAE	a) *Bergenia*
6. FAGACEAE	a) *Quercus*	7. FUMARIACEAE	a) *Dicentra*
7. HYDRANGEACEAE	a) *Hydrangea*	8. IRIDACEAE	a) *Iris*
	b) *Philadelphus*	9. LAMIACEAE	a) *Lamium*

8. OLEACEAE	a) *Fraxinus*	10. LILIACEAE	a) *Hemerocallis*
	b) *Syringa*		b) *Hosta*
9. PINACEAE	a) *Abies*	11. PAEONIACEAE	a) *Paeonia*
	b) *Picea*	12. POLYPODIACEAE	a) *Matteuccia*
	c) *Pinus*	13. RANUNCULACEAE	a) *Anemone*
	d) *Pseudotsuga*		b) *Aquilegia*
10. ROSACEAE	a) *Malus*	14. ROSACEAE	a) *Alchemilla mollis*
	b) *Physocarpos*		
	c) *Prunus*		
	d) *Rosa*		
	e) *Sorbus*		
	f) *Spiraea*		
11. SALICACEAE	a) *Salix*		
	b) *Populus*		
12. SAXIFRAGACEAE	a) *Ribes*		

B. Plant Use in the Landscape.....13 Hours

Outcome: Select plant materials for use in the landscape.

1. Describe the function, value and physical characteristics of plants for the landscape.
2. Describe growth and maintenance requirements for selected species.
5. Describe general practices for establishing herbaceous perennials.
6. Describe general practices for the ongoing maintenance of herbaceous perennials.

SECTION SIX:.....PEST MANAGEMENT.....54 HOURS

A. Integrated Pest Management..... 10 Hours

Outcome: Describe the principles of integrated pest management

1. Discuss the management of ecosystem to prevent organisms from becoming pests.
2. Describe methods to identify potential pest problems.
3. Describe the components of a pest monitoring and recording system.
4. Discuss the concept of threshold relative to carrying out treatments.
5. Explain how to manage the naturally occurring enemies of pests in the landscape.
6. Distinguish between site specific and pest specific strategies.
7. Discuss evaluation of the effectiveness of treatments.

B. Insect Identification and Management.....12 Hours

Outcome: Identify selected insects and their management.

1. Describe the beneficial role of insects.
2. Identify common types of insect damage.
3. Describe selected methods of insect management.
4. Explain the characteristics of insects which enable them to succeed under changing environmental conditions.
5. Compare insect life cycles.
6. Differentiate between insect orders common on the prairies:
   a) Coleoptera
   b) Hemiptera
   c) Hymenoptera
   d) Lepidoptera
7. From insect orders common on the prairies, identify selected insect pests of ornamental landscapes.
8. Recognize native and alien insects which have been identified as having the potential to become pests in the ornamental landscape.

C. Disease Identification and Management.....4 Hours

Outcome: Identify plant diseases and their management.

1. Identify common types of plant symptoms caused by disease organisms.
2. Describe selected methods of disease management.
3. Compare bacteria and fungi diseases
4. Identify selected plant diseases common to the ornamental landscape:
   a) bacterial
   b) fungal
5. Recognize diseases which have been identified as having the potential to become significant pests in the ornamental landscape.

D. Plant Disorders.....2 Hours

Outcome: Identify plant disorders and their management.

1. Identify common symptoms of selected disorders.
2. Recommend management practices to prevent or mitigate selected disorders.

E. Weed Identification and Management.....16 Hours

Outcome: Identify weeds and their management.

1. Describe weed biology.
2. Assess selected integrated methods of weed management:
3. Describe means of classifying weeds using the Weed Control Act of Alberta.
4. Identify selected weeds in the following families:
   a) Asteraceae
   b) Brassicaceae

c) Poaceae

d) Chenopodiaceae

5. Recognize weeds which have been identified as having the potential to become significant pests in the ornamental landscape.

F. Pesticide Safety and Legislation.....10 Hours

Outcome: Explain pesticide legislation and the responsibilities of the Landscape Horticulturist in relation to pest control and the application of pesticides.

1. Describe the role of the Federal Government in pesticide legislation
2. Explain the purpose of exotic species legislation including the Invasive Species Act.
3. Describe the role of the Provincial government in pesticide and pest management legislation
4. Describe the Pest Management Regulatory Agency's (PMRA) pesticide assessment process.
5. Describe pesticide application with regard to personal and public safety.
6. Describe pesticide application with regard to environmental safety.
7. Interpret pest control product information found on product labels, MSDS sheets and other selected resources.
8. Describe the process of attaining a Pesticide Applicator Certificate.

SECTION SEVEN: .....TURF MAINTENANCE..... 22 HOURS

A. Turfgrass Fertilization.....4 Hours

Outcome: Select a fertilizer for turfgrass.

1. Describe the function of turfgrass fertilization.
2. Describe the collection and preparation of soil samples from a turfgrass site.
3. Interpret soil test results.
4. Compare the characteristics of selected types of fertilizers and amendments for turf.
5. Select fertilizers and amendments for specific purposes
6. Calculate application rates.
7. Describe the effects of turfgrass fertilization on other plants in the landscape.
8. Recommend fertilizer schedules that account for seasonal requirements.

B. Sustainable Turfgrass Management Practices.....18 Hours

Outcome: Manage turfgrass to ensure sustainability.

1. Describe year round management techniques for the prairie provinces.
2. Describe water management for turfgrass.
3. Assess methods to manage thatch.
4. Describe causes of soil compaction.
5. Describe methods of solving or mitigating compaction problems.
6. Describe how turfgrass maintenance practices affect soil health.

THIRD PERIOD TECHNICAL TRAINING
LANDSCAPE HORTICULTURIST TRADE
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:..... LANDSCAPE DESIGN FUNDAMENTALS ..... 40 HOURS

A. Introduction to Landscape Design .....1 Hour

Outcome: Describe the scope of landscape design.

1. Describe the practice of landscape design.
2. Explain the roles and responsibilities of the landscape designer.
3. Explain the roles and responsibilities of various project stakeholders.

B. Design Principles and Elements .....6 Hours

Outcome: Analyze landscape design principles and elements

1. Describe the design principles that are applied in the landscape.
2. Describe the design elements that are applied in the landscape.
3. Critique established landscape projects based on design elements and principles.

C. Manual Graphics.....7 Hours

Outcome: Develop manual graphic skills.

1. Demonstrate the use of selected drafting tools.
2. Develop appropriate line weights and line types.
3. Develop lettering sizes and styles.
4. Review scaling of drawings.
5. Describe the basic elements of landscape symbols.
6. Develop selected landscape symbols.

D. Design Process.....14 Hours

Outcome: Apply the landscape design process to a selected landscape project.

1. Describe the techniques for developing a client interview.
2. Prepare a client interview checklist.
3. Conduct a client interview.
4. Describe the function of a design proposal.
5. Prepare a design proposal template.
6. Develop a landscape design proposal.
7. Prepare a site assessment of a project site.
8. Prepare a functional plan for a project site
9. Prepare a concept plant for a project site.

E. Master Plan.....12 Hours

Outcome: Develop a landscape master plan for a selected project.

1. Demonstrate rendering and colouring techniques.
2. Assemble examples of landscape master plans and elevations.
3. Produce a landscape master plan and elevations for a project site.

SECTION TWO: ..... PLANT IDENTIFICATION, USE AND MAINTENANCE III..... 40 HOURS

A. Plant Taxonomy.....27 Hours

Outcome: Identify selected plants and plant families.

1. Demonstrate procedures in plant specimen collection and preparation for herbarium samples.
2. Identify specific taxonomic features of selected plant families and genera.
3. Use taxonomic keys to identify plants.
4. Identify selected woody and herbaceous plants by growth habit and ornamental features.
5. Identify selected woody and herbaceous plants relative to their role in natural ecosystems.
6. Identify primary horticultural references for plant identification.
7. Identify current issues in plant identification and classification for the horticulture industry.
8. Apply binomial nomenclature (genus, specific epithet) to identify selected species from the following chart:

Woody Plants		Herbaceous Annuals & Perennials	
Family	Genera	Family	Genera
1. ANACARDIACEAE	*a) Rhus*	1. AIZOACEAE	*a) Mesembryanthemum*
2. BERBERIDACEAE	*a) Berberis*	2. ASTERACEAE	*a) Zinnia*
3. BETULACEAE	*a) Alnus*	3. CAMPANULACEAE	*a) Campanula*
	b) Betula	4. CARYOPHYLLACEAE	*a) Dianthus*
	c) Corylus	5. CRASSUALACEAE	*a) Sedum*
4. CAPRIFOLIACEAE	*a) Lonicera*		*b) Sempervivum*
	b) Sambucus	6. ERICACEAE	*a) Arctostaphylos*
	c) Symphoricarpos	7. LAMIACEAE	*a) Ajuga*
	d) Viburnum		*b) Lamiastrum*
5. CELASTRACEAE	*a) Euonymus*		*c) Salvia*
6. ERICACEAE	*a) Rhododendron*		*d) Stachys*
7. FABACEAE	*a) Genista*		*e) Thymus*
8. HIPPOCASTANACEAE	*a) Aesculus*	8. MALVACEAE	*a) Lavatera*
9. OLEACEAE	*a) Forsythia*	9. RANUNCULACEAE	*a) Cimicifuga*
10. PINACEAE	*a) Picea*		*b) Clematis*
	b) Pinus		*c) Trollius*
11. JUGLANDACEAE	*a) Juglans*	10. SAXIFRAGACEAE	*a) Astilbe*
12. RHAMNACEAE	*a) Rhamnus*		*b) Heuchera*
13. ROSACEAE	*a) Crataegus*		
	b) Prunus		
	c) Pyrus		
	d) Rosa		
14. SALICACEAE	*a) Populus*		
	b) Salix		
15. TILIACEAE	*a) Tilia*		
16. THYMELACEACE	*a) Daphne*		
17. ULMACEAE	*a) Celtis*		
18. VITACEAE	*a) Parthenocissus*		
	b) Vitis		

B. Plant Use in the Landscape.....13 Hours

Outcome: Select plant materials for use in the landscape.

1. Describe the function, value and physical characteristics of plants for the landscape.
2. Describe growth and maintenance requirements for selected species.

SECTION THREE:.....PLANT PHYSIOLOGY.....20 HOURS

A. Biochemical Processes.....8 Hours

Outcome: Identify primary biochemical processes in plants.

1. Describe the process of photosynthesis.
2. Analyse horticultural practices and environmental factors that affect the rate of photosynthesis.
3. Describe the process of respiration.
4. Analyse horticultural practices and environmental factors that affect the rate of respiration.

B. Transport in the Plant.....4 Hours

Outcome: Explain transport processes in plants.

1. Describe water transport.
2. Describe phloem transport.

C. Growth and Development in Plants.....3 Hours

Outcome: Identify the processes that influence plant growth and development.

1. Describe the process of protein synthesis.
2. Describe the process of reproduction.
3. Describe the effects of selected growth regulators on developmental processes.

D. Plant Stress.....5 Hours

Outcome: Identify physiological factors that affect plant response to stress.

1. Describe how drought stress effects plant growth.
2. Describe adaptive features of selected species relative to drought stress.
3. Assess horticultural practices in relation to drought tolerance.
4. Describe how cold temperatures affect plant cells, tissues and organs.
5. Describe adaptive features of selected species relative to low temperature stress.
6. Describe the acclimation process.
7. Assess horticultural practices that improve plant resistance and tolerance to stresses in order to increase survival rates.
8. Explain variables the determine species susceptibly to pollutants.
9. Identify species that demonstrate significant tolerance or susceptibility to common air and soil-borne pollutants.

SECTION FOUR: ..... SUSTAINABLE IRRIGATION PRACTICES..... 46 HOURS

A. Irrigation System Planning.....1 Hour

Outcome: Identify general factors that govern irrigation system planning.

1. Describe factors involved in planning an irrigation system.

B. Principles of Hydraulics.....5 Hours

***Outcome*: Analyze principles of hydraulics to determine the equipment required for a given irrigation system.**

1. Use hydraulic data to design sprinkler irrigation systems.
2. Describe pressure and elevation relationships.
3. Assess pressure loss in selected equipment.

C. Design Concepts.....9 Hours

Outcome: Design an irrigation system for a residential landscape installation.

1. Explain block-system design theory.
2. Explain quick-coupler design theory.
3. Design an irrigation system for a residential landscape installation.

D. Design Factors.....2 Hours

Outcome: Describe factors when planning irrigation systems.

1. Explain specific design factors in residential and commercial systems.

E. Specifications.....2 Hours

Outcome: Interpret irrigation specifications for a landscape design.

1. Interpret basic irrigation specifications.
2. Develop a materials list from a set of irrigation specifications.

F. Installation.....12 Hours

Outcome: Install an irrigation system.

1. Perform installation procedures for irrigation systems.

G. Maintenance and Repair.....3 Hours

Outcome: Maintain and repair an irrigation system.

1. Describe the maintenance of an irrigation system.
2. Describe procedures for repairing an irrigation system.

H. Systems Troubleshooting.....2 Hours

Outcome: Troubleshoot a malfunctioning irrigation system.

1. List factors for troubleshooting an irrigation system.
2. Develop a troubleshooting checklist.

I. Sustainable Water Management Practices.....10 Hours

Outcome: Describe sustainable water management strategies for irrigation systems.

1. Identify design techniques for water conservation.
2. Describe water auditing procedures.

3. Perform an irrigation system audit.

SECTION FIVE: .....ARBORICULTURE AND URBAN FORESTRY ..... 50 HOURS

A. Introduction.....3 Hours

Outcome: Explain common goals of urban forestry and the role of arboriculture in achieving those goals.

1. Discuss the focus, value, challenges and constraints involved in urban forest management.
2. Describe the common elements of an urban forest management plan.
3. Discuss the role of the arboriculture sector as it relates to urban forestry.
4. Access related resources and organizations.

B. Tree Biology.....6 Hours

Outcome: Use tree anatomy to determine the relative health of trees.

1. Explain how tree phenology is used to determine the timing of arboriculture activities.
2. Identify anatomical and morphological features of branches.
3. Identify common structural problems of young and mature trees.
4. Explain the tree's defence system.

C. Pruning.....6 Hours

Outcome: Assess pruning techniques for trees.

1. Describe the procedure for the pruning of trees.
2. Describe specialty pruning procedures.

D. Tree Support Systems.....2 Hours

Outcome: Describe tree repair techniques.

1. Describe tree bracing, cabling and flexible support systems.
2. Compare tree repair techniques.

E. Tree Removal.....5 Hours

Outcome: Describe tree removal techniques.

1. Describe tree-felling procedures.
2. Describe tree removal rigging and procedures.
3. Demonstrate general chainsaw use and safety.

F. Working Aloft.....4 Hours

Outcome: Demonstrate safe practices when working aloft.

1. Demonstrate selected rope knots.
2. Identify climbing gear and equipment.
3. Assess climbing techniques.
4. Describe aerial lift service operations.

5. Explain aerial rescue procedures.
6. Identify high voltage line awareness.
7. Explain the importance of teamwork when working aloft.

G. Tree Risk Assessment.....7 Hours

Outcome: Describe principles of the hazard evaluation process.

1. Describe the risk assessment process.
2. Practice methods of determining tree condition.

H. Tree Valuation.....6 Hours

Outcome: Assess tree value.

1. Describe the factors involved in valuation.
2. Demonstrate the replacement cost methods of tree valuation.

I. Tree Inventory.....9 Hours

Outcome: Describe the purpose of tree inventory systems.

1. Identify factors involved in a tree inventory.
2. Describe the use of the Global Information System (GIS) for tree inventory.

J. Tree Protection.....1 Hour

Outcome: Explain tree protection.

1. Calculate tree protection zones.
2. Describe how to protect trees on a construction site.

K. Arboriculture and the Law.....1 Hour

Outcome: Describe liability issues related to trees.

1. Describe means of determining legislation relevant to arboriculture work.

SECTION SIX:.....LANDSCAPE CONSTRUCTION II..... 44 HOURS

A. Advanced Landscape Construction.....18 Hours

Outcome: Complete a carpentry project.

1. Interpret plan details for construction of a selected project.
2. Estimate the quantities and types of material needed to construct a selected project.
3. Construct a given project to plan specifications.

B. Water Feature Construction.....14 Hours

Outcome: Install a water feature.

1. Describe the functions of water features in a landscape.
2. Assess available water feature products.
3. Develop a water feature project construction plan.

4. Estimate the quantities and types of material needed to construct a selected project.
5. Install a water feature.

C. Landscape Lighting .....7 Hours

Outcome: Install landscape lighting.

1. Describe the functions of lighting in a landscape.
2. Assess available lighting styles and designs.
3. Develop lighting project construction plan.
4. Estimate the quantities and types of material needed to construct a selected project.
5. Install lighting in conjunction with a water feature.

D. Sustainable Practice in Landscape Construction .....5 Hours

Outcome: Recommend sustainable landscape construction strategies.

1. Describe design and construction practices used to reduce the negative environmental impact of a landscape project.
2. Apply life-cycle assessment to determine environmental impacts of selected construction materials and products.
3. Determine the environmental impacts of selected construction materials and products.
4. Describe the economic impacts of sustainable landscape construction practices.

FOURTH PERIOD TECHNICAL TRAINING
LANDSCAPE HORTICULTURIST TRADE
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:.....LANDSCAPE DESIGN..... 50 HOURS

A. Construction Plans.....32 Hours

Outcome: Prepare landscape construction plans for a project site.

1. Review principles of base plan preparation.
2. Produce a base plan and a title block.
3. Describe the function of a layout and grading plan.
4. Develop a layout and grading plan.
5. Describe the function of a planting plan.
6. Develop a planting plan.
7. Describe the function of a lighting plan.
8. Develop a lighting plan.
9. Describe the function of construction details.
10. Develop construction details.

B. Contract Documentation.....6 Hours

Outcome*: *Prepare landscape contract documents.

1. Describe the functions of specifications and bid documents.
2. Develop specifications and bid documents.

C. Sustainable Landscape Technologies.....6 Hours

Outcome*: *Determine applicable uses of sustainable landscape technologies.

1. Define low impact development.
2. Describe the functions of constructed wetlands.
3. Describe the functions of rain gardens and bioswales.
4. Describe the functions of green roofs and living walls.
5. Describe the functions of permeable paving.
6. Discuss emergent sustainable landscape technologies.

D. Landscape Design Software.....6 Hours

Outcome*: *Describe the functions of selected landscape design software.

1. Describe the functions of computer-aided drafting applications.
2. Describe the functions of 3D modelling applications.
3. Describe the functions of digital image rendering applications.

SECTION TWO: ..... BUSINESS OPERATIONS ..... 36 HOURS

A. Human Resource Management ..... 8 Hours

Outcome*: *Describe provincial legislation as it applies to employment standards.

1. Describe the Labour Standards Act with reference to the various sectors of the landscape industry.
2. Describe typical employee benefits packages and programs.
3. Explain the Alberta Occupational Health and Safety Act regulations as they apply to the workplace.
4. Identify the parameters and requirements of WCB coverage for employees.

B. Staff Recruitment and Retention Strategies ..... 6 Hours

Outcome*: *Identify human resource recruitment and retention strategies.

1. Describe employee recruitment processes.
2. Describe employee retention strategies.
3. Describe employee professional development strategies.
4. Describe the Alberta Apprenticeship Blue Seal Program.
5. Discuss Red Seal/ Interprovincial standards Program.

C. Workplace Mentoring Skills ..... 10 Hours

Outcome*: *Describe mentoring skills for training in the work place.

1. Describe mentoring skills for enhancing employee productivity and job satisfaction.
2. Describe strategies for building productive work teams.
3. Describe selected supervisory and leadership skills.
4. Describe methods for delegating work assignments.
5. Describe the advantages and disadvantages of workplace conflict.
6. Describe selected conflict resolution strategies.

D. Apprenticeship Advisory Network ..... 2 Hours

Outcome*: *Describe the apprenticeship program advisory network.

1. Explain the role and purpose of the advisory network, local apprenticeship committees, and provincial apprenticeship committees.

E. Basic Business Administration ..... 10 Hours

Outcome: Describe basic financial information in the operation of a business.

1. Describe the purpose of an operating budget.
2. Describe the purpose of an income and expense statement as it relates to profitability.
3. Explain job cost information.
4. Describe purchase orders, invoicing and payment options.
5. Relate work team behaviour to the overall profitability of the organization.

SECTION THREE: ..... PLANT IDENTIFICATION, USE AND MAINTENANCE IV ..... 46 HOURS

A. Plant Taxonomy.....33 Hours

Outcome: Identify selected plants and plant families.

1. Demonstrate procedures in plant specimen collection and preparation for herbarium samples.
2. Identify specific taxonomic features of selected plant families and genera.
3. Use taxonomic keys to identify plants.
4. Identify selected woody and herbaceous plants by growth habit and ornamental features.
5. Identify selected woody and herbaceous plants relative to their role in natural ecosystems.
6. Identify primary horticultural references for plant identification.
7. Identify current issues in plant identification and classification for the horticulture industry.
8. Apply binomial nomenclature (genus, specific epithet) to identify selected species from the following chart:

Hardy Bulbs	
Family	Genera
1. ALIACEAE	a) *Allium*
2. IRIDACEAE	a) *Crocus*
3. LILIACEAE	a) *Muscari*
	b) *Narcissus*
	c) *Scilla*
	d) *Tulipa*

Wetland Plants	
Family	Genera
1. ALISIMATACEAE	a) *Sagittaria*
2. EQUISITACEAE	a) *Equisetum*
3. HIPPURIDACEAE	a) *Hippurus*
4. IRIDACEAE	a) *Iris*
5. MENYANTHACEAE	a) *Menyanthese*
6. NYMPHACEAE	a) *Nymphaea*
7. RANUNCULACEAE	a) *Caltha*
8. TYPHACEAE	a) *Typha*

Ornamental Grasses	
Family	Genera
1. POACEAE	a) *Bromus*
	b) *Calamagrostis*
	c) *Festuca*
	d) *Helictrotrichon*
	e) *Molinia*
	f) *Pennisetum*
	g) *Phalaris*

Herbaceous Plants	
Family	Genera
1. ASTERACEAE	a) *Coreopsis*
	b) *Dahlia*
	c) *Gaillardia*
	d) *Liatris*
	e) *Ligularia*
2. BORAGINACEAE	a) *Pulmonaria*
3. BRASSICACEAE	a) *Brassica*
	b) *Matthiola*
4. CANNABACEAE	a) *Humulus*
5. DIPSACEAE	a) *Scabiosa*
6. EUPHORBIACEAE	a) *Euphorbia*
7. FABACEAE	a) *Lupinus*
8. GERANIACEAE	*Geranium*
9. IRIDACEAE	a) *Gladiolus*
10. LILIACEAE	a) *Phormium*
11. LAMIACEAE	a) *Lamiastrum*
	b) *Monarda*
	c) *Nepeta*
12. LINACEAE	a) *Linum*
13. ONAGRACEAE	a) *Fuchsia*
14. PAPAVERACEAE	a) *Papaver*
15. PLANTAGINACEAE	a) *Hebe*
16. POLYPODIACEAE	a) *Athyrium*
17. RANUNCULACEAE	a) *Thalictrum*
18. SCROPHULARIACEAE	a) *Penstemon*
	b) *Veronica*
19. VERBENACEAE	a) *Verbena*

B. Plant Use in the Landscape.....13 Hours

Outcome: Select plant materials for use in the landscape.

1. Describe the function, value and physical characteristics of plants for the landscape.
2. Describe growth and maintenance requirements for selected species.

SECTION FOUR: .....NURSERY AND SOD PRODUCTION ..... 66 HOURS

A. Nursery Production.....24 Hours

Outcome: Describe the common practices in field and container production.

1. Evaluate site conditions for a nursery.
2. Describe essential design factors when planning a production nursery.
3. Explain the process of planning and scheduling for production of selected nursery crops.

4. Analyze soil management strategies in nursery production.
5. Describe field preparation requirements for common production practices.
6. Describe row marking and planting procedures.
7. Describe post planting maintenance procedures.
8. Describe methods of cultivation and weed control in nurseries.
9. Discuss the practice of integrated pest management in a nursery.
10. Discuss selected irrigation systems for nursery production.
11. Describe techniques used to train nursery stock.
12. Explain the procedures employed in harvesting nursery stock.
13. Describe shipping procedures.

B. Container Production.....12 Hours

Outcome: Discuss best practices in container production.

1. Discuss the business rationale for container production of woody plants.
2. Compare selected nursery containers:
   a) impact of pot color on growth and performance of various species
3. Identify components and various blends of media in use for container growing in Alberta.
4. Describe the practices involved in container production.
5. Assess methods of nutrient application.
6. Describe the process of monitoring media fertility.
7. Compare use of selected mulches for winter protection.
8. Assess methods of increasing production and shortening production time.
9. List plant species that have the potential for container production in Alberta.

C. Grading and Shipping Nursery Stock.....3 Hours

Outcome: Describe procedures for the storage, grading, packing, and shipping of nursery stock.

1. Describe the maintenance of nursery stock prior to shipping.
2. Describe grading and standards of Canadian Nursery Trades Association.
3. Describe the procedures for storing and grading of nursery stock.
4. Describe the considerations for packing and shipping.
5. Explain the Domestic Phytosanitary Certification Program and International Standards for Phytosanitary Measures.

D. Propagation of Woody Plants.....22 Hours

Outcome: Demonstrate cultural practices specific to woody plant propagation.

1. Describe sanitation practices.
2. Explain the regulatory and management requirements for record keeping and labelling.
3. Explain seed collection and storage practices.
4. Practice selected treatments to enhance germination.
5. Propagate woody plant seedlings.

6. Describe physiology of selected means of vegetative propagation.
7. Identify means of vegetative propagation unique to woody plant material.
8. Discuss the rationale for selected means of vegetative propagation.
9. Demonstrate selected means of vegetative propagation of woody plants.

E. Sod Production .....5 Hours

Outcome: Explain the primary aspect of sod production.

1. Describe the factors to be considered in choosing a site for sod production.
2. Compare the characteristics of the cultivars used in seed mixtures in the Alberta sod industry.
3. Outline the sod establishment process.
4. Explain common cultural practices employed in sod production.
5. Describe how production practice effects sod quality.
6. Explain the harvesting procedure.
7. Specify methods used to protect sod during shipping.

SECTION FIVE: ..... ESTIMATING, TENDERING AND CONTRACTS ..... 42 HOURS

A. Estimating .....22 Hours

Outcome: Prepare a quote for a landscape project.

1. Identify the requirements for a project cost estimate.
2. Describe factors considered in a labour cost breakdown.
3. Assess rationale for sub-contracting.
4. Describe factors considered in equipment costing.
5. Estimate material costs.
6. Describe factors considered in labour costing.
7. Estimate labour costs.
8. Identify overhead and administrative costs.
9. Apply production rates to provide costing for final tender price.
10. Determine the required or desired percentage profit.
11. Prepare a project cost estimate.

B. Guarantees and Warranties.....4 Hours

Outcome: Explain the parameters of guarantees and warranties.

1. Describe what the supplier's guarantees cover.
2. Describe what the contractor's guarantees cover.
3. Explain the maintenance aspect of a contract as it relates to a guarantee or warranty period.
4. Describe what the retailer's guarantees cover.
5. Identify various practices used to ensure that the guarantor is protected.

C. Tendering, Contracts and Bonds.....4 Hours

Outcome: Prepare a written tender for a landscape design project.

1. Describe the tendering process.
2. Explain the purpose of subcontracts and purchase orders.
3. Describe Addendum and Change Orders (C.O.)
4. Explain deficiencies and guarantees.
5. Describe Construction Completion Certificates (C.C.C.)
6. Describe Final Acceptance Certificates (F.A.C.)
7. Explain the principles of contract law, and the legal entities that are required for a complete contract as it relates to landscaping.

D. Types of Contracts.....6 Hours

Outcome: Describe selected landscape-related contracts.

1. Describe selected types of contracts used in landscape construction and maintenance.
2. Explain provincial government regulations.
3. Explain insurance requirements.
4. Describe bonding procedures and requirements.
5. Explain deposits, including their purpose and method of posting and forfeiture.
6. Explain how holdbacks affect contract administration and bidding parameters.
7. Describe selected certificates issued upon completion of contract.
8. Describe builder's liens.

E. Scheduling.....6 Hours

Outcome: Prepare a written schedule for a landscape project.

1. Explain the process of construction scheduling.
2. Identify principles of project management.
3. Develop a chart to schedule the construction sequence.

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